

**TEMPERATURE AND MOISTURE DEPENDENCE OF DIELECTRIC  
CONSTANT FOR BULK SILICA AEROGELS\***

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The dielectric constants for silica aerogels are among the lowest measured for any solid material. The silica aerogels also exhibit low thermal expansion and are thermally stable to temperatures exceeding 400°C. However, due to the high porosity and unusual nano-structure of aerogels, the dielectric constant depends strongly on moisture content and thus also, on temperature. This paper presents data for the dielectric constants of silica aerogels as a function of moisture content and for temperatures in the range from 20°C to 100°C. Dielectric constant data is also given for silica aerogels which have been heat treated in vacuum to temperatures up to 500°C, then cooled to 20°C for measurements in dry air. The measurements are made on bulk aerogel pieces at 22GHz microwave frequency, using a cavity perturbation method. The results of the dependence found here for bulk materials can be inferred to apply also to thin films of silica aerogels having similar nano-structures.

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